This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of Claims:**

1-62. (Canceled).

63. (Currently Amended) A method of designing a direct expansion geothermal heat exchange system, comprising:

providing an exterior, subterranean heat exchanger; and

~~providing~~ circulating an R-410A refrigerant through the exterior heat exchanger.

64. (Previously Presented) The method of claim 63, further comprising providing a polyolester oil for use in conjunction with a direct expansion system utilizing an R-410A refrigerant.

65. (Previously Presented) The method of claim 63, further comprising providing a single piston metering device in the heating mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches
*0 to 50 feet (depth of borehole below compressor unit)
1.5……..0.041
2……0.049
2.5……..0.055
3……0.059
3.5……..0.063
4……0.065
4.5……..0.068
5……0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5……..0.039

2……0.047

2.5……..0.052

3……0.056

3.5……..0.060

4……0.062

4.5……..0.065

5……0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5……..0.037

2……0.044

2.5……..0.050

3……0.053

3.5……..0.057

4……0.059

4.5……..0.061

5……0.064

66. (Previously Presented) The method of claim 63, further comprising providing, in the cooling mode, a self-adjusting thermostatic expansion valve which is located proximate to the interior air handler and is sized at 140%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity in the cooling mode;

providing a single piston metering device situated proximate to the interior air handler in the cooling mode, with the following pin restrictor (Acroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Cooling Tonnage Design - Pin Restrictor Size in Inches

*0 to 50 feet (height of interior air handler above the compressor unit)

1.5……..0.058

2.....0.070
2.5.....0.077
3.....0.085
3.5.....0.093
4.....0.099
4.5.....0.100
5.....0.112

67. (Previously Presented) The method of claim 63, further comprising providing a charging of the refrigerant system in the cooling mode until the peak operational efficiency is reached and the superheat is within the 10 to 25 degree F range, the head pressure is within the 305 to 405 PSI range, the liquid head pressure is within the 195 to 275 PSI range, which is similar to the head pressure range in the heating mode, the suction pressure is within the 80 to 160 PSI range, and the suction/vapor temperature is within the 37 degree to 55 degree F. temperature range.

68. (Previously Presented) A method of designing a direct expansion geothermal heat exchange system comprising providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi.

69. (Previously Presented) The method of claim 68, further comprising providing an R-410A refrigerant.

70. (Previously Presented) The method of claim 68, further comprising providing a polyolester oil for use in conjunction with a direct expansion system comprising providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi.

71. (Previously Presented) The method of claim 68, further comprising providing a single piston metering device in the heating mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:
Maximum Heating Tonnage Design……Pin Restrictor Central Bore Hole Size in Inches
*0 to 50 feet (depth of borehole below compressor unit)
1.5……..0.041
2……..0.049
2.5……..0.055
3……..0.059
3.5……..0.063
4……..0.065
4.5……..0.068
5……..0.071

*51 to 175 feet (depth of borehole below compressor unit)
1.5……..0.039
2……..0.047
2.5……..0.052
3……..0.056

3.5……..0.060
4……0.062
4.5……..0.065
5……0.067

*176 to 300 feet (depth of borehole below compressor unit)
1.5……..0.037
2……0.044
2.5……..0.050
3……0.053
3.5……..0.057
4……0.059
4.5……..0.061
5……0.064

72. (Previously Presented) The method of claim 68, further comprising providing, in the cooling mode, a self-adjusting thermostatic expansion valve which is located proximate to the interior air handler and is sized at 140%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity in the cooling mode;

providing a single piston metering device situated proximate to the interior air handler in the cooling mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Cooling Tonnage Design - Pin Restrictor Size in Inches

*0 to 50 feet (height of interior air handler above the compressor unit)
1.5……..0.058
2……0.070
2.5……..0.077
3……0.085
3.5……..0.093
4……0.099

4.5.....0.100

5.....0.112

73. (Previously Presented) The method of claim 68, further comprising providing a charging of the refrigerant system in the cooling mode until the peak operational efficiency is reached and the superheat is within the 10 to 25 degree F range, the head pressure is within the 305 to 405 PSI range, the liquid head pressure is within the 195 to 275 PSI range, which is similar to the head pressure range in the heating mode, the suction pressure is within the 80 to 160 PSI range, and the suction/vapor temperature is within the 37 degree to 55 degree F. temperature range.

74. (Currently Amended) A direct expansion geothermal heat exchange system comprising:

an exterior, subterranean heat exchanger; and

an R-410A refrigerant disposed in the exterior heat exchanger.

75. (Previously Presented) The system of claim 74, further comprising a polyolester oil for use in conjunction with a direct expansion system utilizing an R-410A refrigerant.

76. (Previously Presented) The system of claim 74, further comprising a single piston metering device in the heating mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches
*0 to 50 feet (depth of borehole below compressor unit)
1.5……..0.041
2……0.049
2.5……..0.055
3……0.059
3.5……..0.063
4……0.065
4.5……..0.068
5……0.071

*51 to 175 feet (depth of borehole below compressor unit)
1.5……..0.039
2……0.047
2.5……..0.052
3……0.056
3.5……..0.060
4……0.062

4.5……..0.065
5……0.067

*176 to 300 feet (depth of borehole below compressor unit)
1.5……..0.037
2……0.044
2.5……..0.050
3……0.053
3.5……..0.057
4……0.059
4.5……..0.061
5……0.064

77. (Previously Presented) The system of claim 74, further comprising, in the cooling mode, a self-adjusting thermostatic expansion valve which is located proximate to the interior air handler and is sized at 140%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity in the cooling mode; and

a single piston metering device situated proximate to the interior air handler in the cooling mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:
Maximum Cooling Tonnage Design - Pin Restrictor Size in Inches
*0 to 50 feet (height of interior air handler above the compressor unit)
1.5……..0.058
2……0.070
2.5……..0.077
3……0.085
3.5……..0.093
4……0.099
4.5……..0.100
5……0.112

78. (Previously Presented) The system of claim 77, further comprising charging the refrigerant system in the cooling mode until the peak operational efficiency is reached and the superheat is within the 10 to 25 degree F range, the head pressure is within the 305 to 405 PSI range, the liquid head pressure is within the 195 to 275 PSI range, which is similar to the head pressure range in the heating mode, the suction pressure is within the 80 to 160 PSI range, and the suction/vapor temperature is within the 37 degree to 55 degree F. temperature range.

79. (Previously Presented) A direct expansion geothermal heat exchange system comprising a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi.

80. (Previously Presented) The system of claim 79, further comprising an R-410A refrigerant.

81. (Previously Presented) The system of claim 79, further comprising a polyolester oil for use in conjunction with a direct expansion system comprising a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi.

82. (Previously Presented) The system of claim 79, further comprising a single piston metering device in the heating mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:
Maximum Heating Tonnage Design…….Pin Restrictor Central Bore Hole Size in Inches
*0 to 50 feet (depth of borehole below compressor unit)
1.5……..0.041
2……..0.049
2.5……..0.055
3……..0.059
3.5……..0.063
4……..0.065
4.5……..0.068
5……..0.071

*51 to 175 feet (depth of borehole below compressor unit)
1.5……..0.039
2……..0.047
2.5……..0.052
3……..0.056

3.5……..0.060
4……0.062
4.5……..0.065
5……0.067

*176 to 300 feet (depth of borehole below compressor unit)
1.5……..0.037
2……0.044
2.5……..0.050
3……0.053
3.5……..0.057
4……0.059
4.5……..0.061
5……0.064

83. (Previously Presented) The system of claim 79, further comprising, in the cooling mode, a self-adjusting thermostatic expansion valve which is located proximate to the interior air handler and is sized at 140%, plus or minus 10% of 100%, of the maximum compressor tonnage design capacity in the cooling mode;

providing a single piston metering device situated proximate to the interior air handler in the cooling mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Cooling Tonnage Design - Pin Restrictor Size in Inches

*0 to 50 feet (height of interior air handler above the compressor unit)
1.5……..0.058
2……0.070
2.5……..0.077
3……0.085
3.5……..0.093
4……0.099

4.5.....0.100

5.....0.112

84. (Previously Presented) The system of claim 68, further comprising charging the refrigerant system in the cooling mode until the peak operational efficiency is reached and the superheat is within the 10 to 25 degree F range, the head pressure is within the 305 to 405 PSI range, the liquid head pressure is within the 195 to 275 PSI range, which is similar to the head pressure range in the heating mode, the suction pressure is within the 80 to 160 PSI range, and the suction/vapor temperature is within the 37 degree to 55 degree F. temperature range.

85. (Previously Presented) A method of designing a direct expansion geothermal heat exchange system comprising:

providing an R-410A refrigerant; and

providing a single piston metering device in the heating mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design.....Pin Restrictor Central Bore Hole Size in Inches

*0 to 50 feet (depth of borehole below compressor unit)

1.5.....0.041
2.....0.049
2.5.....0.055
3.....0.059
3.5.....0.063
4.....0.065
4.5.....0.068
5.....0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5.....0.039
2.....0.047
2.5.....0.052
3.....0.056
3.5.....0.060
4.....0.062
4.5.....0.065
5.....0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5.....0.037
2.....0.044

2.5……..0.050

3……0.053

3.5……..0.057

4……0.059

4.5……..0.061

5……0.064

86. (Previously Presented) A method of designing a direct expansion geothermal heat exchange system comprising:

providing an R-410A refrigerant; and

providing a charging of the refrigerant system in the cooling mode until the peak operational efficiency is reached and the superheat is within the 10 to 25 degree F range, the head pressure is within the 305 to 405 PSI range, the liquid head pressure is within the 195 to 275 PSI range, which is similar to the head pressure range in the heating mode, the suction pressure is within the 80 to 160 PSI range, and the suction/vapor temperature is within the 37 degree to 55 degree F. temperature range.

87. (Previously Presented) A method of designing a direct expansion geothermal heat exchange system comprising:

providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi; and

providing a single piston metering device in the heating mode, with the following pin restrictor (Aeroquip type) sizing, based on central hole bore size in inches, utilized, plus or minus a maximum of two (2) one thousandths of an inch (0.001) central hole bore size, within the following depth ranges:

Maximum Heating Tonnage Design.....Pin Restrictor Central Bore Hole Size in Inches

*0 to 50 feet (depth of borehole below compressor unit)

1.5.....0.041

2.....0.049

2.5.....0.055

3.....0.059

3.5.....0.063

4.....0.065

4.5.....0.068

5.....0.071

*51 to 175 feet (depth of borehole below compressor unit)

1.5.....0.039

2.....0.047

2.5.....0.052

3.....0.056

3.5.....0.060

4.....0.062

4.5.....0.065

5.....0.067

*176 to 300 feet (depth of borehole below compressor unit)

1.5.....0.037

2……0.044

2.5……..0.050

3……0.053

3.5……..0.057

4……0.059

4.5……..0.061

5……0.064

88. (Previously Presented) A method of designing a direct expansion geothermal heat exchange system comprising:

providing a refrigerant with heating/cooling operational working pressures between 80 psi and 405 psi; and

providing a charging of the refrigerant system in the cooling mode until the peak operational efficiency is reached and the superheat is within the 10 to 25 degree F range, the head pressure is within the 305 to 405 PSI range, the liquid head pressure is within the 195 to 275 PSI range, which is similar to the head pressure range in the heating mode, the suction pressure is within the 80 to 160 PSI range, and the suction/vapor temperature is within the 37 degree to 55 degree F. temperature range.

89. (Previously Presented) A method of designing a direct expansion geothermal heat exchange system comprising:

providing an R-410A refrigerant; and

utilizing the R-410A refrigerant in the refrigerant heat exchange tubing of a direct expansion geothermal heat change system wherein the refrigerant heat exchange tubing extends to depths of approximately 100-300 feet below the surface.

90. (Previously Presented) A direct expansion geothermal heat exchange system comprising:

an R-410A refrigerant; and

refrigerant heat exchange tubing positioned approximately 100-300 feet below the surface.